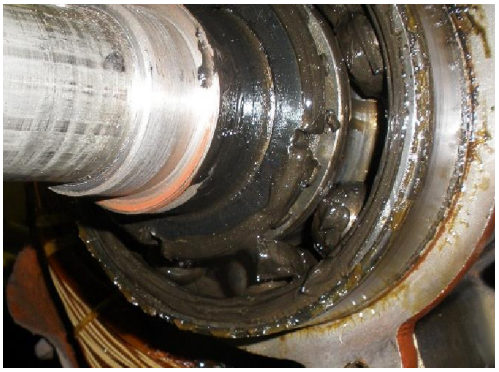
Issue 5: Bud's Take on Can a Cage be the Root Cause of Bearing Failure?

In my many years of reviewing bearing failures, I can't recall one time pointing to the cage as the root cause. In a recent article I stated that the primary job of a cage is to keep rolling elements from contacting each other. Cages do have surfaces that are subjected to rubbing friction and have a part in transferring load between the rolling elements and raceways. Carrying load is not a function of the cage. With those statements, can the cage be the root cause of a bearing failure?

Review of Common Cage Failures

In most cases I have reviewed the other bearing components show damage leaving the cage as an afterthought or the cage failure is a result of an external issue. I will discuss a few common cage failures to better explain my comments.

One of the most common causes of **cage fracture** is vibration or impact. This vibration can be caused by an internal source such as rapid accelerations, or external sources such as other machinery, misaligned system, etc.



Picture 1: Broken steel cage

A steel or bronze cage bearing operating at excessive speed can produce high inertia forces that could cause **cage fractures**. In a polyimide cage the result could be **melting** or **burning**. These failures are caused by the wrong bearing for the application or simple over speed.

There are other service type issues that can cause cage failure including contamination, chemical attack, high temperature, skewing, etc. All are a result of an outside source.

Picture 2: Broken Bronze Cage

Cage Manufacturing and Design Failures

There are a few manufacturing and design flaws that could lead to cage failure.

With **pressed (stamped cages)** they could become work-hardened and produce cracks. In a window type cage, sharp corners or bends can result in cracking. Another possibility is cracked or malformed rivets during the forming process**.** All of the common types of cages, **pressed, plastic (injection molded), bronze** and **machined** have the possibility of inclusions and voids in the material. Other items of concern could be malformed interface surfaces, welds, and general geometry issues.

Picture 3: Root cause?

Conclusion:

To answer the question, **YES** the cage can be the root cause of a bearing failure. Being that a cage is made of steel, plastic, bronze, etc…all materials have the ability to fail. In addition, it is a manufactured product with the possibility of design or manufacturing flaws. It is extremely difficult to follow a failure back to the cage as the root cause. Once a cage fails the bearing tends to have secondary catastrophic failure that masks the cage as the failure's cause.

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